PARENT-IMPLEMENTED MAND TRAINING: ACQUISITION OF FRAMED MANDING IN A YOUNG BOY WITH PARTIAL HEMISPHERECTOMY

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This study examined the effects of parent-implemented mand training on the acquisition of framed manding in a 4-year-old boy who had undergone partial hemispherectomy. Framed manding became the predominant mand form when and only when the intervention was implemented with each preferred toy, but minimal generalization to untrained toys nevertheless occurred. A pure mand test suggested that manding was controlled by the relevant motivating operation.

Key words: differential reinforcement, generalization, hemispherectomy, language training, mand training, verbal behavior

Mands are verbal operants that are evoked by a specific motivating operation (MO) and maintained by reinforcement relevant to the MO (Skinner, 1957). Mand training is an important component in early intervention, because a strong mand repertoire enables one to appropriately request preferred items and activities. A recent study by Hernandez, Hanley, Ingvarsson, and Tiger (2007) suggested that teaching a sentence frame (e.g., ''May I have the cars, please?'') rather than a single-word mand (e.g., ''cars'') increased the likelihood of generalization across untargeted preferred items. The current experiment employed similar procedures while exploring the feasibility of training the participant's mother to carry out training of framed mands in a home setting. Two methodological limitations of the previous study were addressed. First, Hernandez et al. used a free-operant procedure, in which observers scored putative mand topographies regardless of whether the relevant MO was in effect (i.e., the items were out of reach). In the current study, the observers scored putative mands as mands only when the participant did not have access to the preferred item. Second, in the current study, a pure mand test was conducted in which the preferred items were moved out of the participant's visual field, further decreasing the likelihood that the responses may have functioned as tacts rather than mands.

METHOD

Participant and Setting

Caleb was 4 years old at the time of the study. His mother reported that at 8 months of age, an invasive tumor the size of a large orange had been removed from the left hemisphere of his brain, leading to the loss of the entire temporal lobe and sections of the occipital, parietal, and frontal lobes. Caleb spoke in single words and three- to four-word phrases. His mother reported that he did not reliably produce complete and grammatically correct sentences.

Response Measurement and Interobserver Agreement

Framed mands were defined as saying ''Can I have the [toy], please?'' Incomplete-sentence mands were defined as phrases that included the

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name of the toy but did not include the whole targeted frame (e.g., ''have the train,'' ''I want to play trains,'' ''play with bubbles''). Single-word mands were defined as saying the name of the preferred toy. Observers used 10-s partial-interval recording to score the occurrence of single-word, incomplete-sentence, or framed mands. The observers also scored whether the framed mands were prompted (i.e., immediately preceded by an echoic model) or unprompted, and whether the putative mands occurred when the relevant MO was present (i.e., when the preferred item was out of reach). Only mands that occurred when the preferred item was out of reach were counted as such and included in the analysis. Caleb's mother served as the primary observer.

A second observer simultaneously but independently collected data during 46% of sessions. An agreement was scored if the observers agreed on all scoring within a given 10-s interval, and a disagreement was scored if the observers disagreed on any scoring within the interval. Interobserver agreement was calculated for each session by dividing the number of agreements by the total number of intervals and averaged 99% across all sessions (range, 91% to 100%).

Procedure and Design

Caleb's mother conducted all sessions in the family's living room. The author supervised pilot sessions with the mother and trained her how to conduct the measurement and experimental procedures. Subsequently, she met with the author weekly and reviewed video clips of a subset of the sessions to ensure procedural fidelity. First, she identified 10 toys that were evaluated in a paired-choice preference assessment (Fisher et al., 1992). The three most highly preferred toys (whistle, bubbles, and trains) were used in the subsequent mand training analysis. A brief tact assessment indicated that Caleb was able to tact each item three consecutive times.

Next, Caleb's mother conducted the mand training analysis, in which the effects of differential reinforcement contingent on framed mands were evaluated using a multiple baseline design across responses. Each session consisted of three components, with one preferred toy presented in each component. The order of components was always the same: trains, followed by bubbles, and then the whistle. In each component, his mother presented the relevant toy, but kept it out of his reach. In baseline, she provided 30-s access to the preferred toy contingent on single-word, incomplete-sentence, or framed mands. After 30 s, she again restricted the toy (constituting the start of the next opportunity to respond) until Caleb emitted another mand. For the intervention, his mother provided access to the toys contingent on the occurrence of framed mands only. She employed a constant 5-s prompt delay (Halle, Marshall, & Spradlin, 1979), using echoic prompting, to teach the framed mand. At the start of the intervention phase, the mother provided an immediate echoic prompt (e.g., ''Say, 'can I have the whistle, please?''') during the first two opportunities. She then inserted a 5-s delay between the start of the opportunity (i.e., the presentation or restriction of the toy) and the delivery of the echoic prompt. If two consecutive opportunities occurred without Caleb emitting an unprompted response, his mother reverted to immediate prompting for the next two consecutive opportunities, and then implemented the 5-s delay again. Both prompted and unprompted framed mands produced 30-s access to the preferred toy, but only unprompted mands were included in the analysis. If no responding occurred for 60 s during either baseline or intervention, his mother removed the toy from his visual field and then re-presented it; this constituted the start of another opportunity to respond. Each session component was terminated after five opportunities.

A pure mand test immediately followed the mand training analysis. The purpose of this test was to evaluate whether Caleb would mand for

the items while they were out of sight, and whether he would mand for the preferred items and refrain from manding for a nonpreferred item. His mother identified the nonpreferred item as a bottle of medicine that Caleb did not like. The pure mand test consisted of two sessions conducted on consecutive days. At the beginning of each session, all four items (whistle, bubbles, train, and medicine) were placed in front of Caleb and he was allowed to interact with the items for 1 min. His mother then placed the items in a box, which was moved out of sight. Any mand (single word, incomplete sentence, or framed) produced 30-s access to the item, and his mother then placed the item back in the box, which remained out of sight. An item was removed from the array when Caleb had manded for it five consecutive times. If he manded for that item again he was reminded that the item had been removed and asked to choose something else. If he did not mand for 60 s, his mother showed him the items in the box, which was then removed from sight. This constituted a new opportunity for manding. The session was terminated following three consecutive opportunities with no manding. (The session would also have been terminated if all four items had met the removal criterion, but this never occurred.)

RESULTS AND DISCUSSION

Figure 1 (top three panels) shows the results of the mand training analysis. In baseline, incomplete sentences emerged as Caleb's predominant mand form. With the onset of the intervention, framed mands increased to high levels when and only when his mother introduced the prompt delay and restricted contingency. However, when she implemented the intervention for trains, minimal generalization was seen to bubbles. When she introduced the intervention for bubbles, minimal generalization was seen for the whistle. In the pure mand analysis (bottom panel), Caleb manded first for the bubbles and then for the trains until his mother restricted access to these items. This indicates that requests for these two items likely functioned purely as mands (and not as tacts) because the requests were made while the items were out of sight (Wallace, Iwata, & Hanley, 2006). The fact that Caleb never manded for the nonpreferred item (medicine) during the pure mand test suggests that restriction of access to preferred items functioned as an MO for manding. However, this conclusion is tentative because Caleb never manded for the whistle (which was the most preferred toy in the initial preference assessment). The whistle may have lost its reinforcing value more quickly than the other two toys because it offers a rather limited range of possible play activities.

The current study extends Hernandez et al. (2007) in at least three distinct ways. First, Hernandez et al. used a free-operant arrangement, in which putative mand forms were measured independent of whether the relevant MO (the items being out of reach) was in effect. Therefore, some of the scored responses may not have functioned as mands. The current study employed a trial-based analysis, in which mands were scored only when the relevant MO was in effect. Second, in the Hernandez et al. study, the preferred items were always within the participants' field of vision, leaving open the possibility that the mands may have functioned partially as tacts. The pure mand test conducted in the current study addressed this limitation. Third, the current results suggest the feasibility of teaching parents to prompt and differentially reinforce framed manding in a home setting.

It is important to note that because different mand forms (single word, incomplete sentence, and framed) produced reinforcement in all baselines, only the first instance of framed manding in untreated baseline can be considered generalization (i.e., the framed mand responses that occurred in Session 5 in the bubbles baseline and Session 10 in the whistle baseline). All subsequent framed mands that occurred during the baseline conditions may

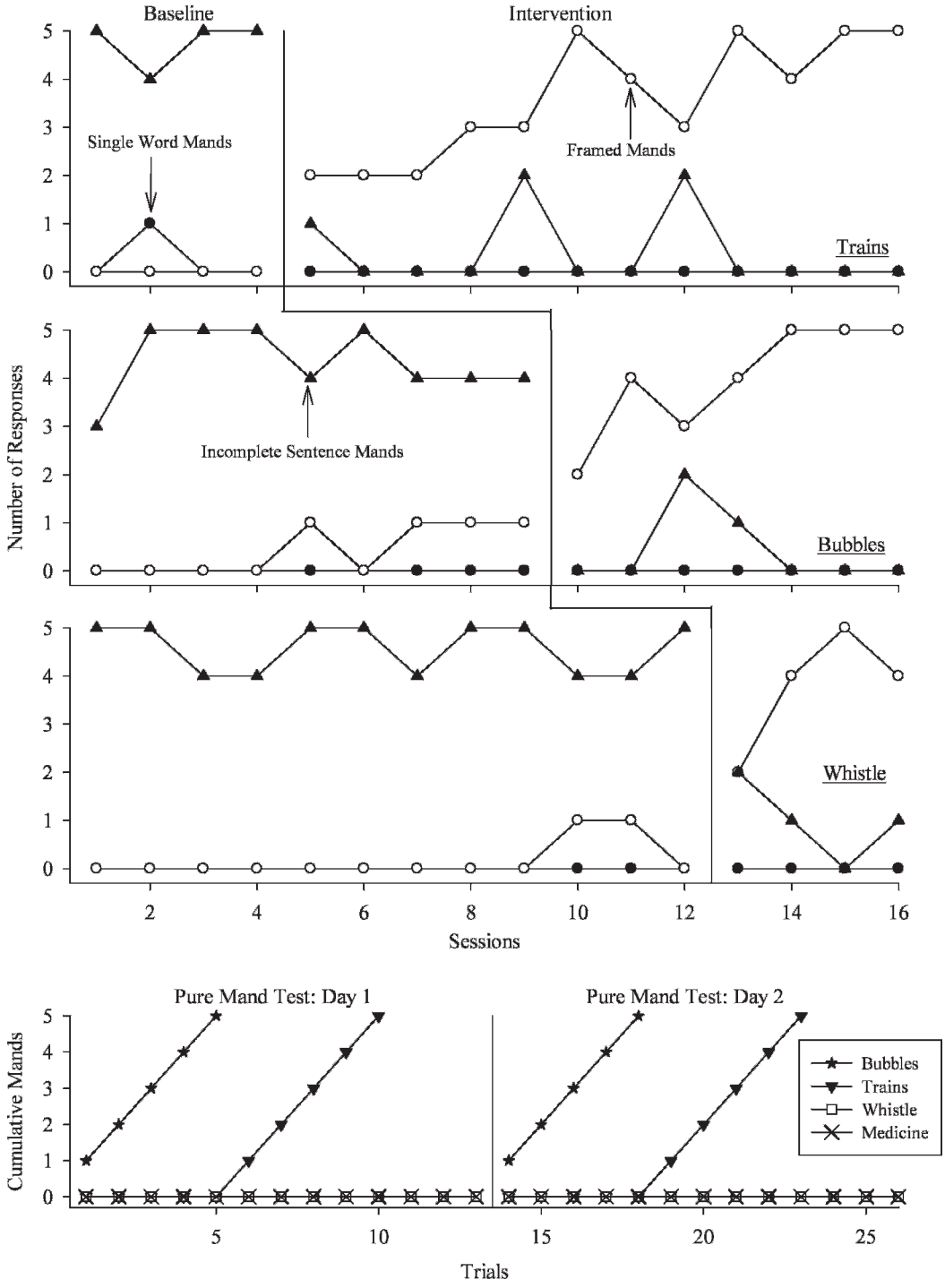

Figure 1. The top three panels show the number of target responses for each of the three session components. The bottom panel shows the cumulative number of mands during the pure mand test. The legend in the bottom panel applies to that panel only.

have been maintained by the reinforcement contingency (i.e., the framed mand responses that occurred in Sessions 7 through 9 in the bubbles baseline and Session 11 in the whistle baseline). These responses collectively can be described as representing the indirect effects of the intervention. These indirect effects were less robust (i.e., fewer responses occurred) than in Hernandez et al. (2007). One possible reason for this discrepancy is that Caleb had a history of engaging in incomplete-sentence forms as mands, whereas in the previous study, the participants had a history of single-word or inappropriate mands. Some of the incomplete-sentence mands and the framed mands were topographically similar and may have led to greater persistence of incomplete-sentence mands for Caleb. Clearly, continued mand training would be necessary for him to acquire a generalized and flexible repertoire of grammatically correct framed mands. The current intervention can be seen as a step toward that goal.

A limitation of the current study is that, although the author and the mother viewed videotaped session during weekly meetings, formal fidelity data were not collected, and the tapes were not preserved for later scoring. The inclusion of systematic evaluations of treatment fidelity would strengthen future studies that evaluate parent-implemented interventions in the home. Finally, the current evaluation was limited because few exemplars were included. Future research should include probes with a greater number of preferred items to which manding might generalize (cf. Baer, Peterson, & Sherman, 1967).

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